

CLAIMS

1. A reverse operation control circuit for a lawn tractor having an engine, a battery, a starter motor and a PTO, comprising:
 - a) an ignition switch for selectively energizing said starter motor with said battery to start the engine; and
 - b) an override switch that allows operation of a PTO driven implement while the lawn tractor is in reverse when an actuator of the override switch is in a first position and inhibits operation of the PTO driven implement while the lawn tractor is in reverse when the actuator of the override switch is in a second position, said override switch inhibits said ignition switch from energizing said starter motor with said battery when said actuator of the override switch is in said first position.
2. The reverse operation control circuit of claim 1 wherein the PTO driven implement is a mower blade.
3. The reverse operation control circuit of claim 1 wherein movement of said actuator of said override switch from said first position to said second position allows said ignition switch to selectively energize said starter motor with said battery.
4. The reverse operation control circuit of claim 1 wherein a path between said ignition switch and a starter solenoid is open when said actuator of the override switch is in said first position to inhibit said ignition switch from selectively energizing said starter motor with said battery.
5. The reverse operation control circuit of claim 1 wherein the override switch is a sustained action two position switch.
6. The reverse operation control circuit of claim 1 further comprising a PTO switch that controls engagement of the PTO driven implement, the PTO switch inhibits said ignition switch from selectively energizing said starter motor with said battery when the PTO switch causes engagement of the PTO driven implement.

7. The reverse operation control circuit of claim 1 further comprising a PTO switch that senses engagement of the PTO driven implement, the PTO switch inhibits said ignition switch from selectively energizing said starter motor with said battery when the PTO switch senses engagement of the PTO driven implement.

8. The reverse operation control circuit of claim 6 wherein a path between said ignition switch and a starter solenoid is open when the PTO switch senses engagement of the PTO driven implement to inhibit said ignition switch from selectively energizing said starter motor with said battery.

9. The reverse operation control circuit of claim 7 wherein a path between said ignition switch and a starter solenoid is open when the PTO switch causes engagement of the PTO driven implement to inhibit said ignition switch from selectively energizing said starter motor with said battery.

10. The reverse operation control circuit of claim 1 further comprising an engagement switch that senses engagement of a brake, the engagement switch inhibits said ignition switch from selectively energizing said starter motor with said battery when the engagement switch does not sense engagement of the brake.

11. The reverse operation control circuit of claim 1 further comprising an engagement switch that senses engagement of a transmission, the engagement switch inhibits said ignition switch from selectively energizing said starter motor with said battery when the engagement switch senses engagement of the transmission.

12. The reverse operation control circuit of claim 10 wherein a path between said ignition switch and a starter solenoid is open when the engagement switch does not sense engagement of the brake to inhibit said ignition switch from selectively energizing said starter motor with said battery.

13. The reverse operation control circuit of claim 11 wherein a path between said ignition switch and a starter solenoid is open when the engagement switch senses

engagement of the transmission to inhibit said ignition switch from selectively energizing said starter motor with said battery.

14. A reverse operation control circuit for a lawn tractor having an engine and a PTO, comprising:

a) an operator presence switch for detecting the presence of an operator on the lawn and garden tractor; and

b) an override switch that allows operation of a PTO driven implement while the lawn tractor is in reverse when the override switch is in a first position and inhibits operation of the PTO driven implement while the lawn tractor is in reverse when the override switch is in a second position, said operator presence switch and said override switch prevent said PTO driven implement from operating when an operator is not present and said override switch is in said first position.

15. The reverse operation control circuit of claim 14 wherein the override switch is a sustained action two-position switch.

16. The reverse operation control system of claim 14 wherein said operator presence switch and said override switch prevent said PTO driven implement from operating when an operator is not present and said override switch is in said first position by shutting the engine down.

17. The reverse operation circuit of claim 14 wherein said operator presence switch is a seat switch that senses whether an operator is sitting on a seat of the lawn tractor.

18. The reverse operation control system of claim 14 wherein the engine is a magneto operated engine and the operator presence switch and the override switch prevent said engine from operating when an operator is not present and the override switch is in the first position by grounding a magneto.

19. The reverse operation control system of claim 14 wherein the engine is a magneto operated engine and the operator presence switch and the override switch

prevent said engine from operating when an operator is not present and the override switch is in the first position by grounding a magneto to prevent the PTO driven implement from operating.

20. A reverse operation control circuit for a lawn tractor having an engine and a PTO, comprising:

a) an operator presence switch for detecting the presence of an operator on the lawn and garden tractor;

b) an additional safety switch connected to said operator presence switch, wherein said operator presence switch and said additional safety switch prevent the engine from operating when said additional safety switch is in a first state and an operator not present; and

c) an override switch that allows operation of the engine while the lawn tractor is in reverse when the override switch is in a first position and inhibits operation of the engine while the lawn tractor is in reverse when the override switch is in a second position, said operator presence switch and said override switch bypass said additional safety switch to prevent said PTO driven implement from operating when an operator is not present and said override switch is in said first position regardless of the state of the additional safety switch.

21. The reverse operation control circuit of claim 20 wherein the override switch is a sustained action two-position switch.

22. The reverse operation control circuit of claim 20 wherein said operator presence switch is a seat switch that senses whether an operator is sitting on a seat of the lawn tractor.

23. The reverse operation control system of claim 20 wherein the engine is a magneto operated engine and the operator presence switch and the override switch prevent said engine from operating when an operator is not present and the override switch is in the first position by grounding a magneto to thereby prevent the PTO driven implement from operating.

24. The reverse operation control system of claim 20 wherein said additional safety switch is a PTO engagement switch, wherein said operator presence switch and said PTO engagement switch prevent the engine from operating when an operator is not present and a state of the PTO engagement switch indicates that the PTO driven implement is engaged.

25. The reverse operation control system of claim 20 wherein the additional safety switch is an engagement switch, wherein said operator presence switch and said engagement switch prevent the engine from operating when an operator is not present and a state of the engagement switch indicates that a brake is not engaged.

26. The reverse operation control system of claim 20 wherein the additional safety switch is an engagement switch, wherein said operator presence switch and said engagement switch prevent the engine from operating when an operator is not present and a state of the engagement switch indicates that a transmission is engaged.

27. A reverse operation control circuit for a lawn tractor having an engine and a PTO, comprising:

- a) a magneto coupled to the engine;
- b) an operator presence switch for detecting the presence of an operator on the lawn and garden tractor;
- c) an additional safety switch connected to said operator presence switch, wherein said operator presence switch and said additional safety switch provide a path from the magneto to ground to prevent the engine from operating when said additional safety switch is in a first state and an operator not present;
- d) an override switch that allows operation of a PTO driven implement while the lawn tractor is in reverse when the override switch is in a first position and inhibits operation of the PTO driven implement while the lawn tractor is in reverse when the override switch is in a second position, said operator presence switch and said override switch provide a path from the magneto to ground that bypasses said additional safety switch to prevent said engine from operating when an operator is not present and said

override switch is in said first position regardless of the state of the additional safety switch.

28. The reverse operation control circuit of claim 27 wherein said operator presence switch is a seat switch that senses whether an operator is sitting on a seat of the lawn tractor.

29. The reverse operation control system of claim 27 wherein the engine is a magneto operated engine and the operator presence switch and the override switch prevent said engine from operating when an operator is not present and the override switch is in the first position by grounding a magneto.

30. The reverse operation control system of claim 27 wherein said additional safety switch is a PTO engagement switch, wherein said operator presence switch and said PTO engagement switch prevent the engine from operating when an operator is not present and a state of the PTO engagement switch indicates that the PTO driven implement is engaged.

31. The reverse operation control system of claim 27 wherein the additional safety switch is an engagement switch, wherein said operator presence switch and said engagement switch prevent the engine from operating when an operator is not present and a state of the engagement switch indicates that a brake is not engaged.

32. The reverse operation control system of claim 27 wherein the additional safety switch is an engagement switch, wherein said operator presence switch and said engagement switch prevent the engine from operating when an operator is not present and a state of the engagement switch indicates that a transmission is engaged.

33. A reverse operation control circuit for a lawn tractor having an engine, a starter motor for starting the engine, and a PTO, comprising:

- a) a reverse sensing switch for sensing when the lawn tractor is in reverse;
- b) a PTO switch for sensing when a PTO driven implement is engaged; and

c) a mow in reverse override switch having an actuator that is movable between a first position and a second position, wherein said mow in reverse override switch prevents the starter motor from starting the engine when the actuator is in the first position and wherein said reverse sensing switch, said PTO switch, and said mow in reverse override switch prevent said engine from operating when the lawn tractor is in reverse, the PTO is engaged, and the actuator is in the second position.

34. The reverse operation control circuit of claim 33 wherein the mow in reverse override switch is a two position sustained action switch.

35. The reverse operation control system of claim 33 wherein the mow in reverse override switch allows the starter motor to start the engine when the actuator is in the second position.

36. The reverse operation control system of claim 33 movement of the override switch actuator to the first position allows the engine to operate when the lawn tractor is in reverse, the PTO is engaged, and the actuator is in first position.

37. A reverse operation control circuit for a lawn tractor having an engine and a PTO, comprising:

- a) a magneto coupled to the engine;
- b) a battery;
- c) a solenoid;
- d) an ignition switch for selectively communicating current flow from the battery to the solenoid to start the engine;
- e) a reverse sensing switch for sensing when the lawn tractor is in reverse;
- f) a PTO switch for sensing when a PTO driven implement is engaged;
- g) a mow in reverse override switch having an actuator that is movable between a first position and a second position, wherein said mow in reverse override switch opens a path from the battery to the solenoid to prevent the engine from starting when the actuator is in the first position and said reverse sensing switch, said PTO switch, and said mow in reverse override switch providing a path from said magneto to ground to prevent

said engine from operating when the lawn tractor is in reverse, the PTO driven implement is engaged, and the actuator is in the second position.

38. The reverse operation control circuit of claim 37 wherein the mow in reverse override switch is a two position sustained action switch.

39. The reverse operation control system of claim 37 wherein the mow in reverse override switch closes a path from the battery to the solenoid when the actuator is in the second position.

40. The reverse operation control system of claim 37 wherein said path from said magneto to ground is open when the override switch actuator is in the first position, allowing the engine to operate when the lawn tractor is in reverse, the PTO driven implement is engaged, and the actuator is in first position.

41. The reverse operation control system of claim 37 wherein said mow in reverse override switch includes first and second poles wherein said first pole opens the path from the battery to the solenoid to prevent the engine from starting when the actuator is in the first position and the second pole closes the path from the magneto to ground to prevent the engine from operating when the lawn tractor is in reverse, the PTO driven implement is engaged, and the actuator is in the second position.

42. A method of controlling reverse operation of a lawn tractor, comprising:
a) allowing operation of a PTO driven implement while the lawn tractor is in reverse when an actuator of an override switch is in a first position;
b) inhibiting operation of the PTO driven implement while the lawn tractor is in reverse when the actuator of the override switch is in a second position; and
c) inhibiting energizing of a starter motor when the actuator of the override switch is in said first position.

43. The method of claim 42 wherein the PTO driven implement is a mower blade.

44. The method of claim 42 further comprising moving the actuator of the

override switch from said first position to said second position to allow energizing of the starter motor with the battery.

45. A method of controlling reverse operation of a lawn tractor, comprising:

- a) detecting whether an operator is present on the lawn and garden tractor;
- b) allowing operation of a PTO driven implement while the lawn tractor is in reverse when an override switch is in a first position;
- c) inhibiting operation of the PTO driven implement while the lawn tractor is in reverse when the override switch is in a second position;
- d) preventing said PTO driven implement from operating when an operator is not present and said override switch is in said first position.

46. The method of claim 45 wherein said PTO driven implement is prevented from operating when an operator is not present and said override switch is in said first position by shutting the engine down.

47. The method of claim 45 said the PTO driven implement is prevented from operating when an operator is not present and the override switch is in the first position by grounding a magneto.

48. A method of controlling reverse operation of a lawn tractor, comprising:

- a) detecting whether an operator is present on the lawn and garden tractor;
- b) preventing the engine from operating when an additional safety switch is in a first state and an operator not present;
- c) allowing operation of the engine while the lawn tractor is in reverse when an override switch is in a first position;
- d) inhibiting operation of the engine while the lawn tractor is in reverse when the override switch is in a second position by bypassing said additional safety switch to prevent said PTO driven implement from operating when an operator is not present and said override switch is in said first position regardless of the state of the additional safety switch.

49. A method of controlling reverse operation of a lawn tractor, comprising:

- a) sensing when the lawn tractor is in reverse;
- b) sensing when a PTO driven implement is engaged;
- c) preventing a starter motor from starting a lawn tractor engine when an override switch actuator is in a first position; and
- d) preventing said engine from operating when the lawn tractor is in reverse, the PTO driven implement is engaged, and the actuator is in a second position.

50. The method of claim 49 further comprising allowing the starter motor to start the engine when the override switch actuator is in the second position.

51. The method of claim 49 further comprising allowing the engine to operate when the lawn tractor is in reverse, the PTO driven implement is engaged, and the actuator is in first position.